

Seasonal forecast skill for the Bering Sea cold pool

Kelly Kearney

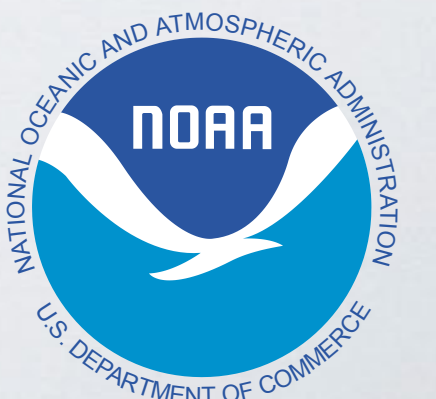
*University of Washington, Joint Institute for the Study of Atmosphere and Ocean (JISAO)
NOAA Alaska Fisheries Science Center (AFSC)*

Al Hermann, Wei Cheng, Ivonne Ortiz, Kerim Aydin

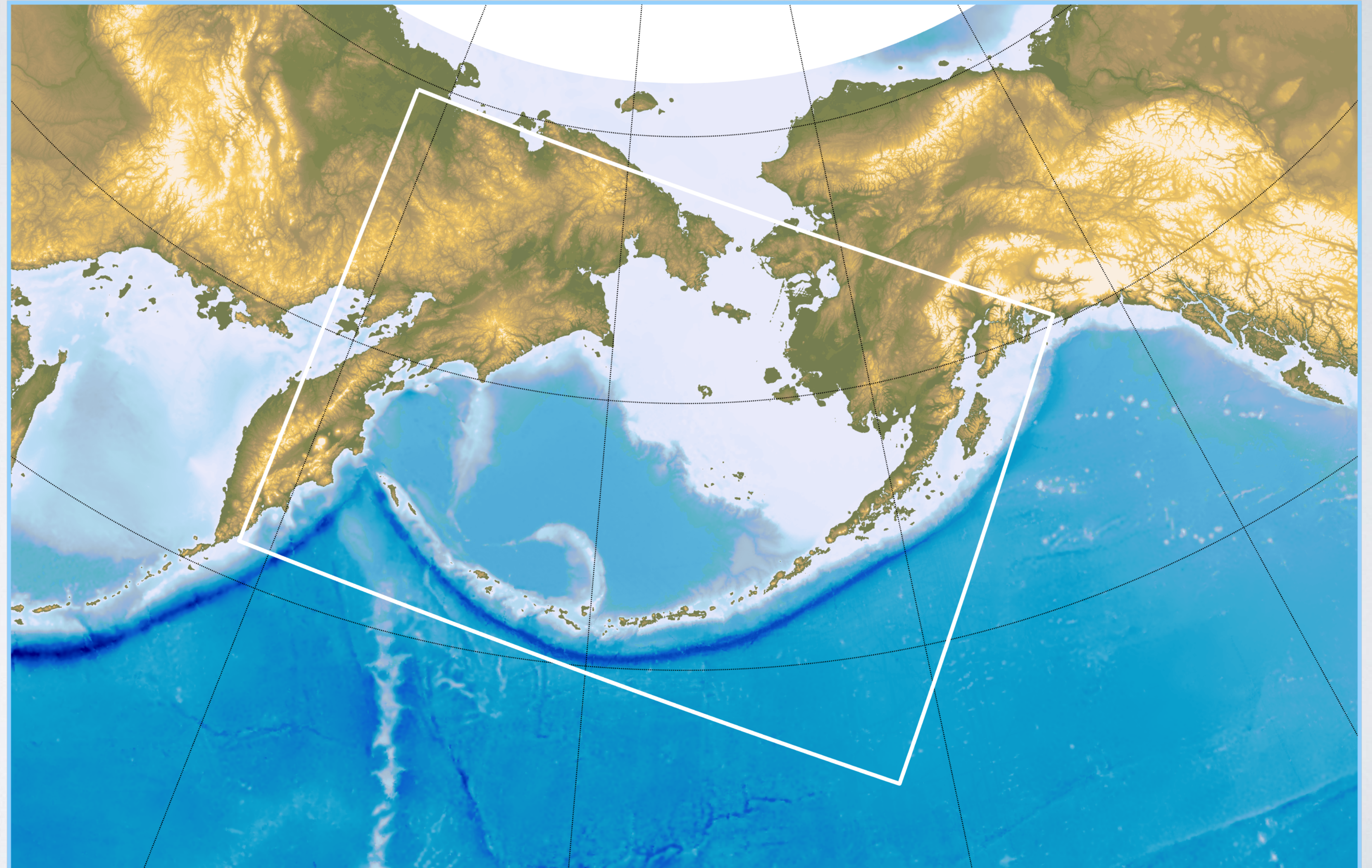
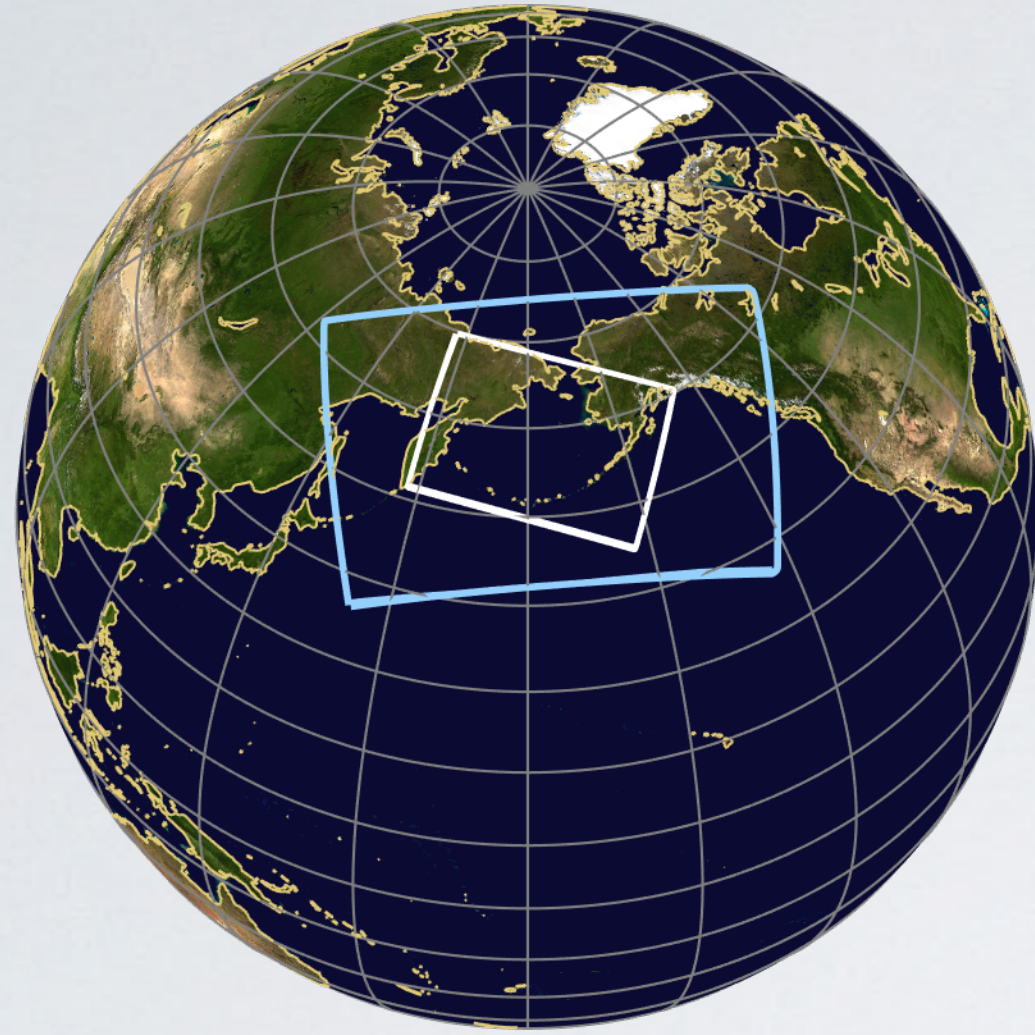
*University of Washington, Joint Institute for the Study of Atmosphere and Ocean (JISAO)
NOAA Alaska Fisheries Science Center (AFSC)
NOAA Pacific Marine Environmental Laboratory (PMEL)*

Funding: *NOAA Modeling, Analysis, Predictions, and Projections (MAPP) Program*

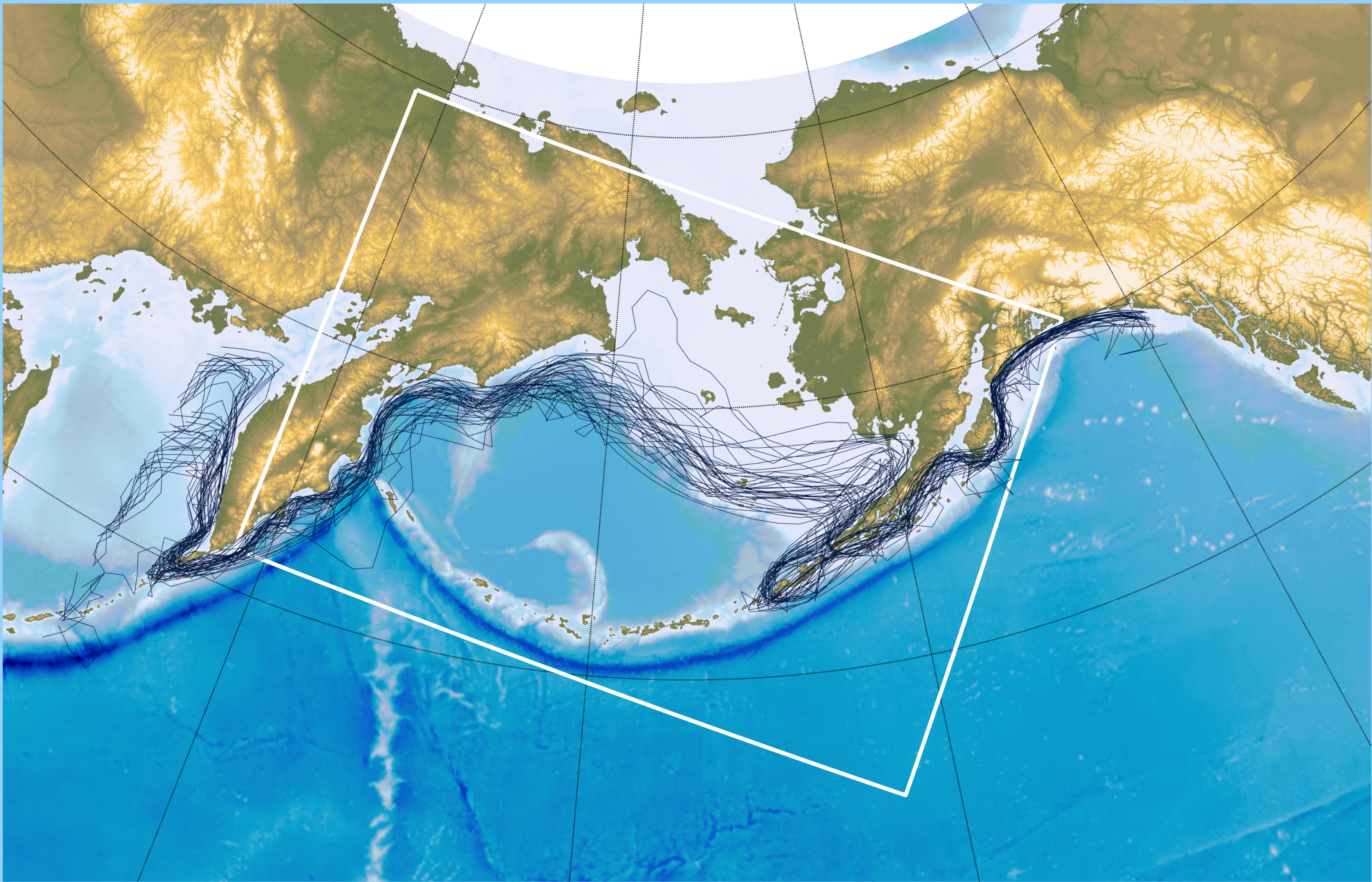
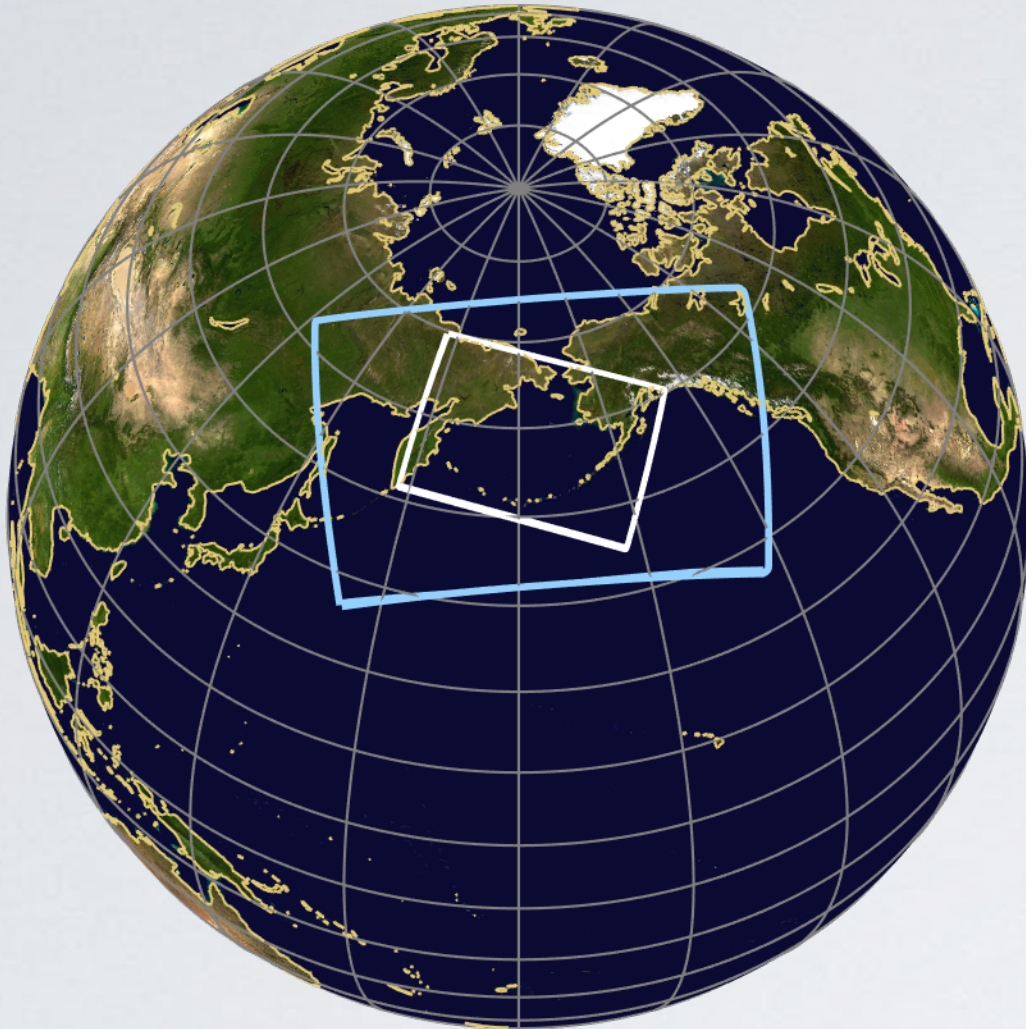
PICES 2019 Annual Meeting
Victoria, BC, Canada



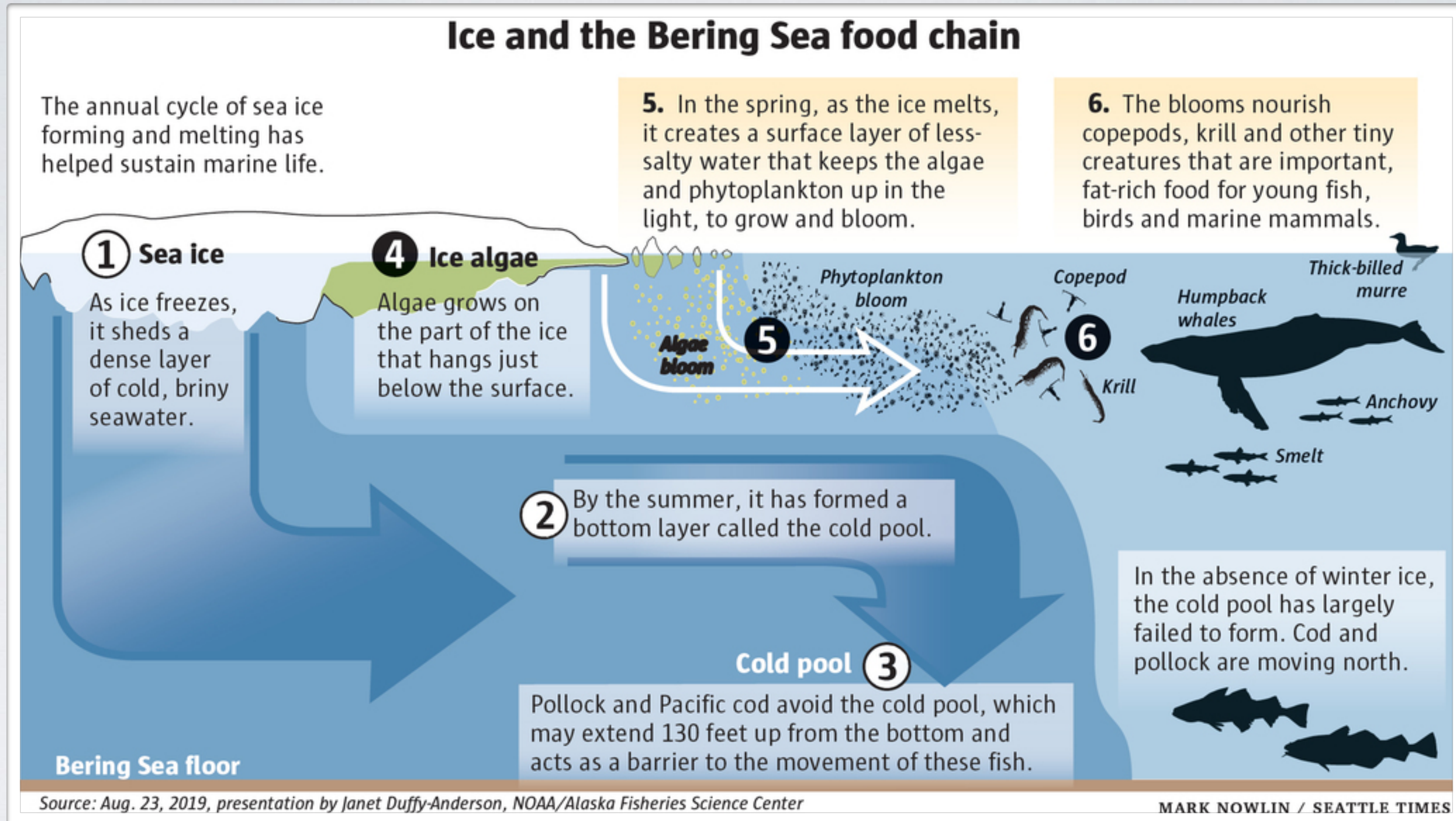
What is the Bering Sea cold pool, and why forecast it?



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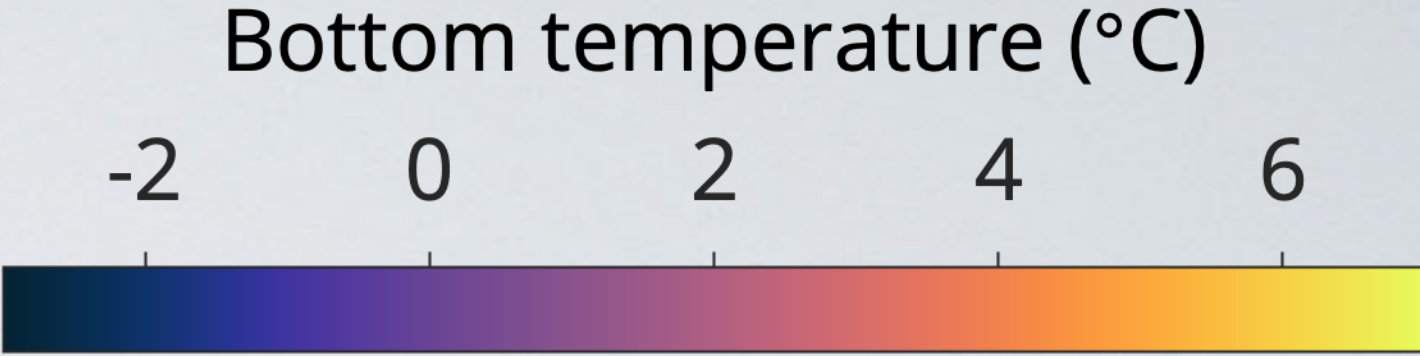
Sep: summer survey data finalized

↑
Oct: stock assessments written

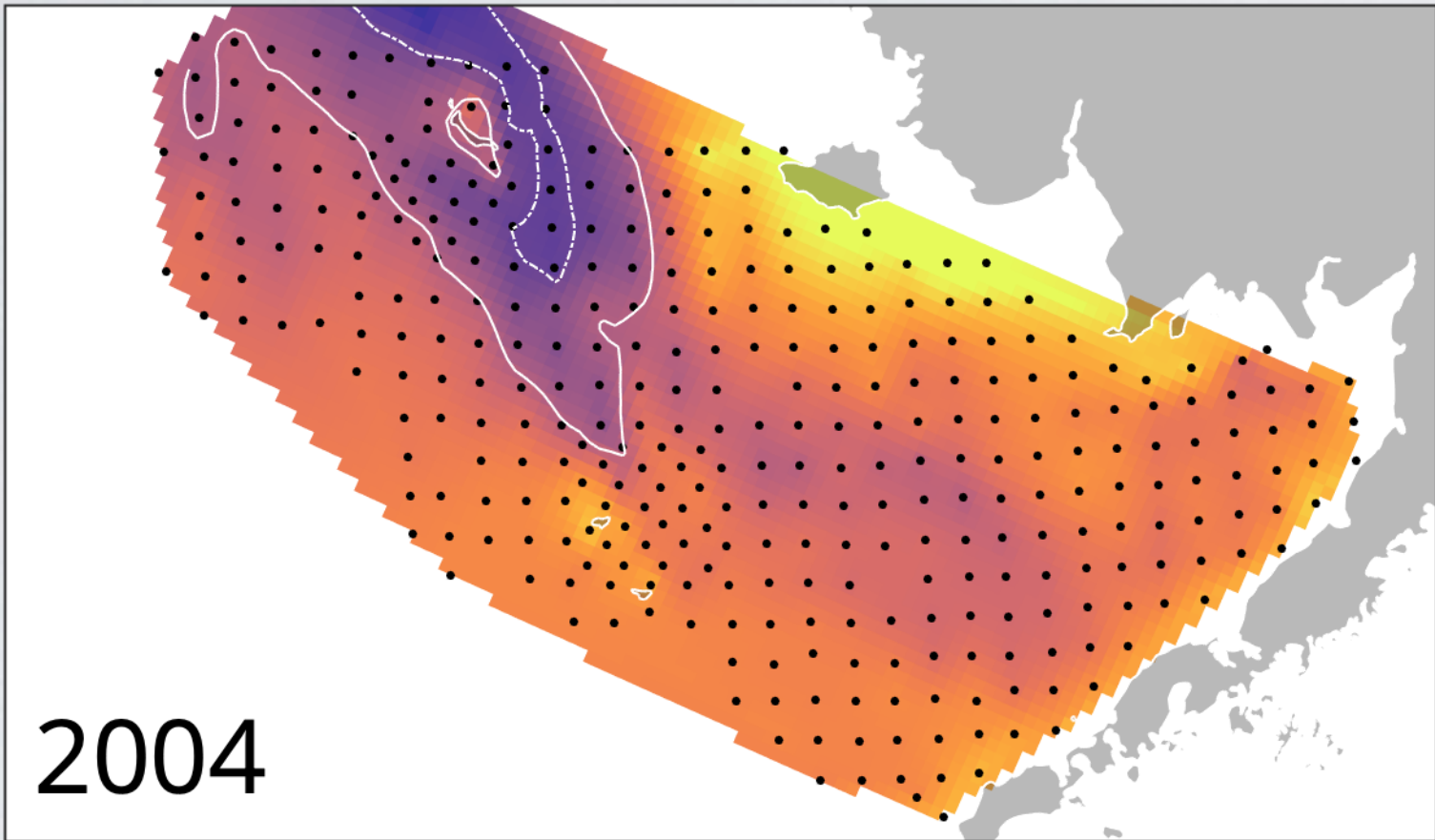
↑
Dec: final quotas set

↑
May-July: summer surveys

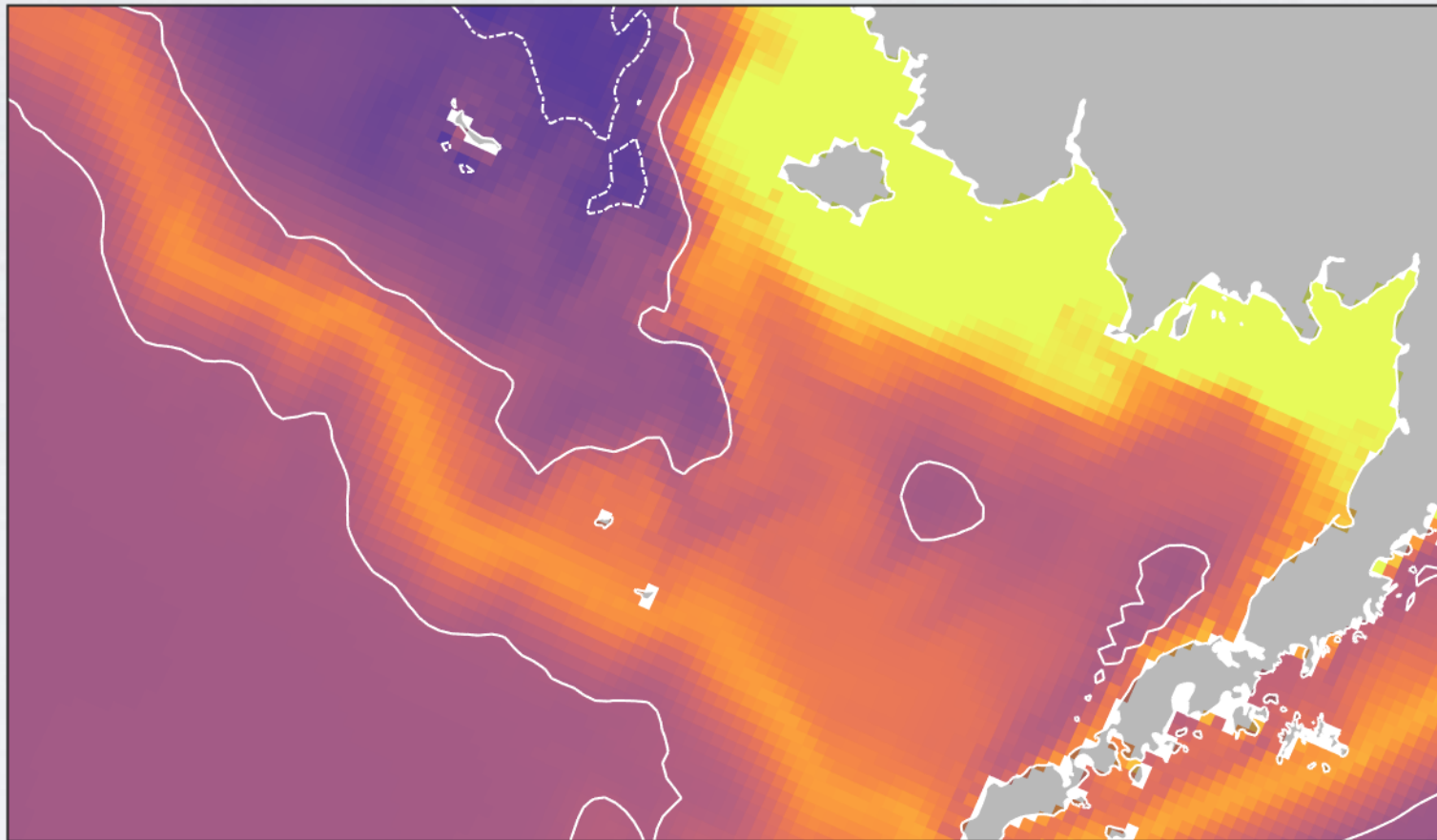
Can we simulate the cold pool?



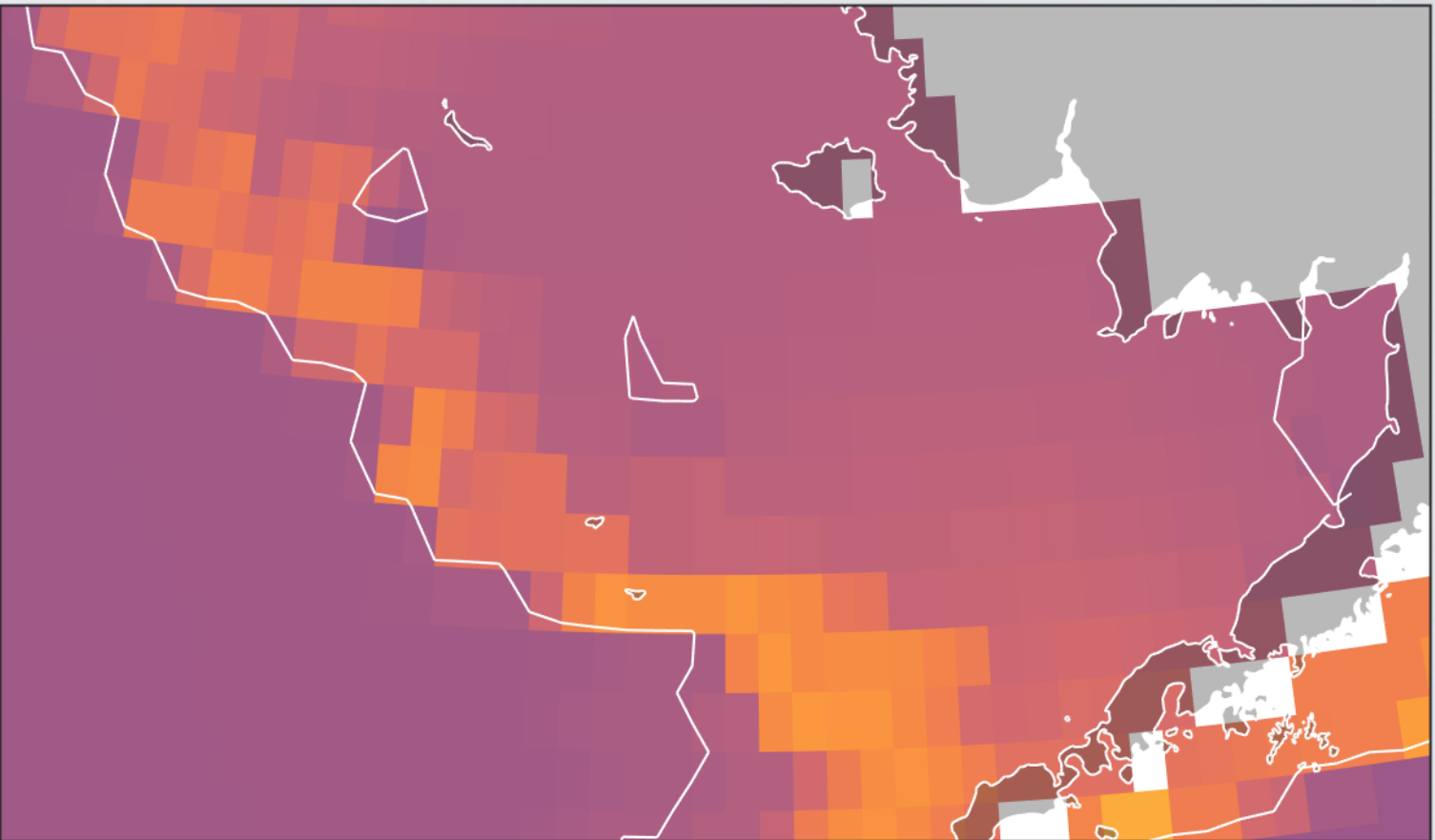
Groundfish survey



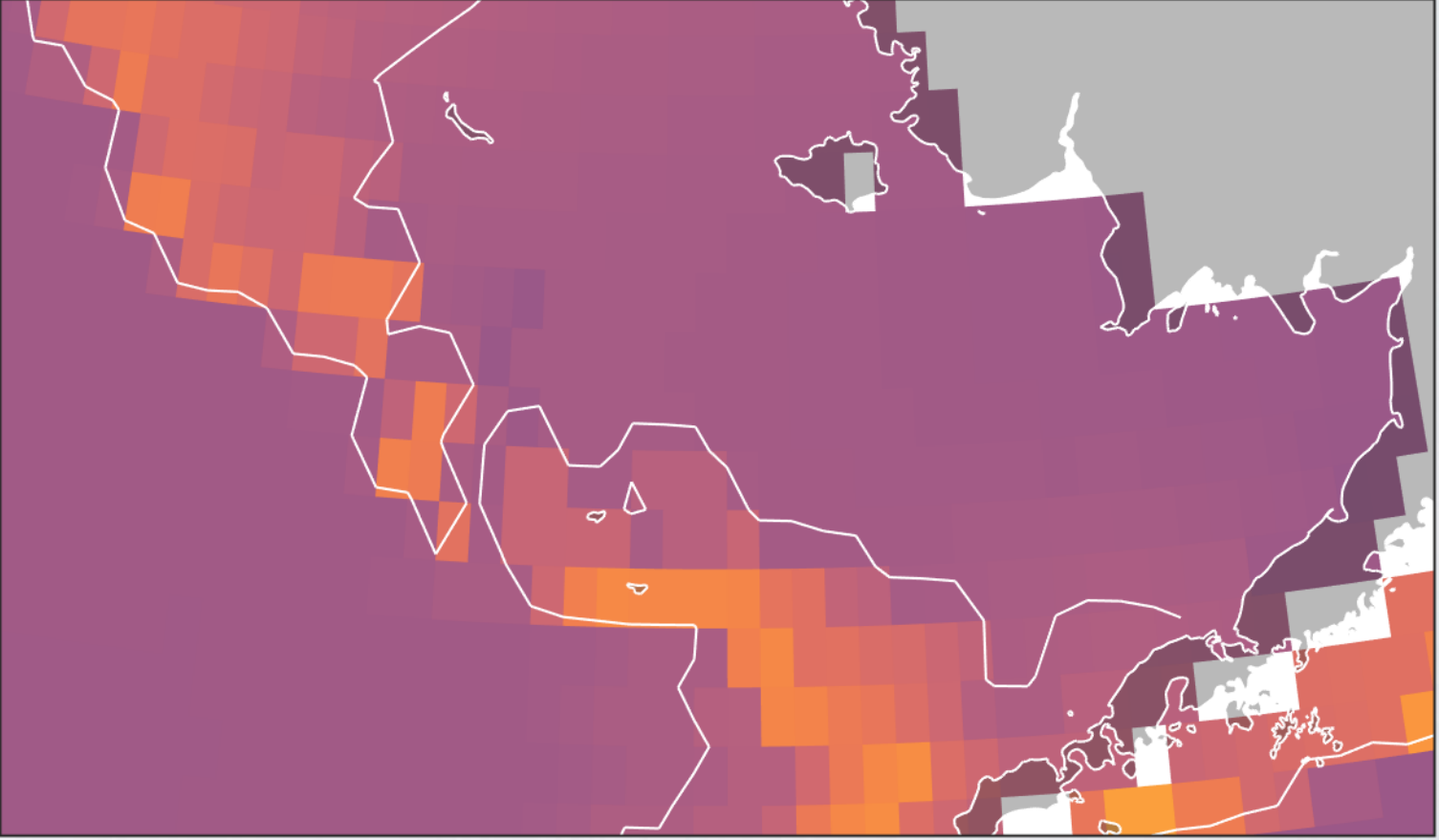
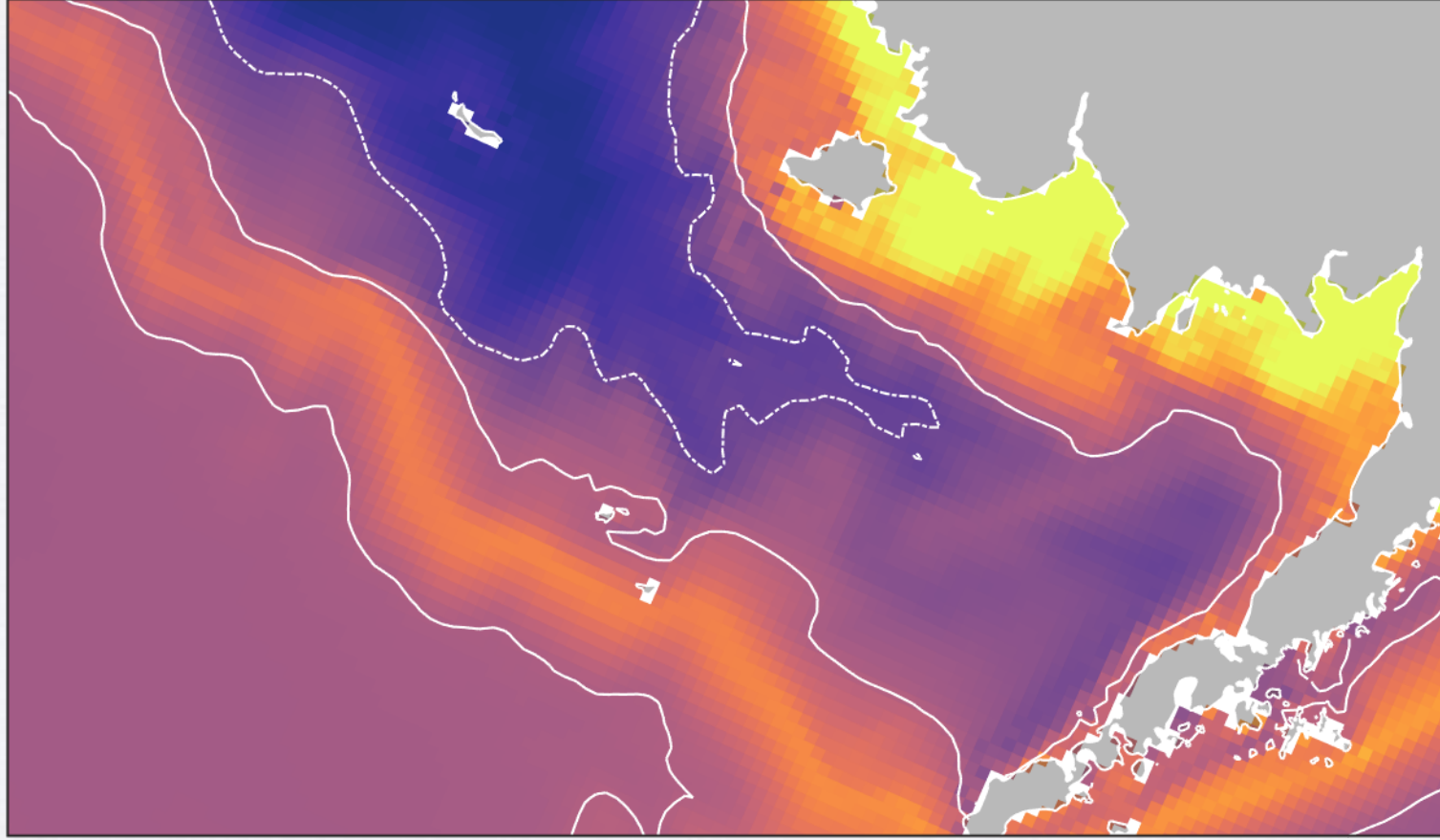
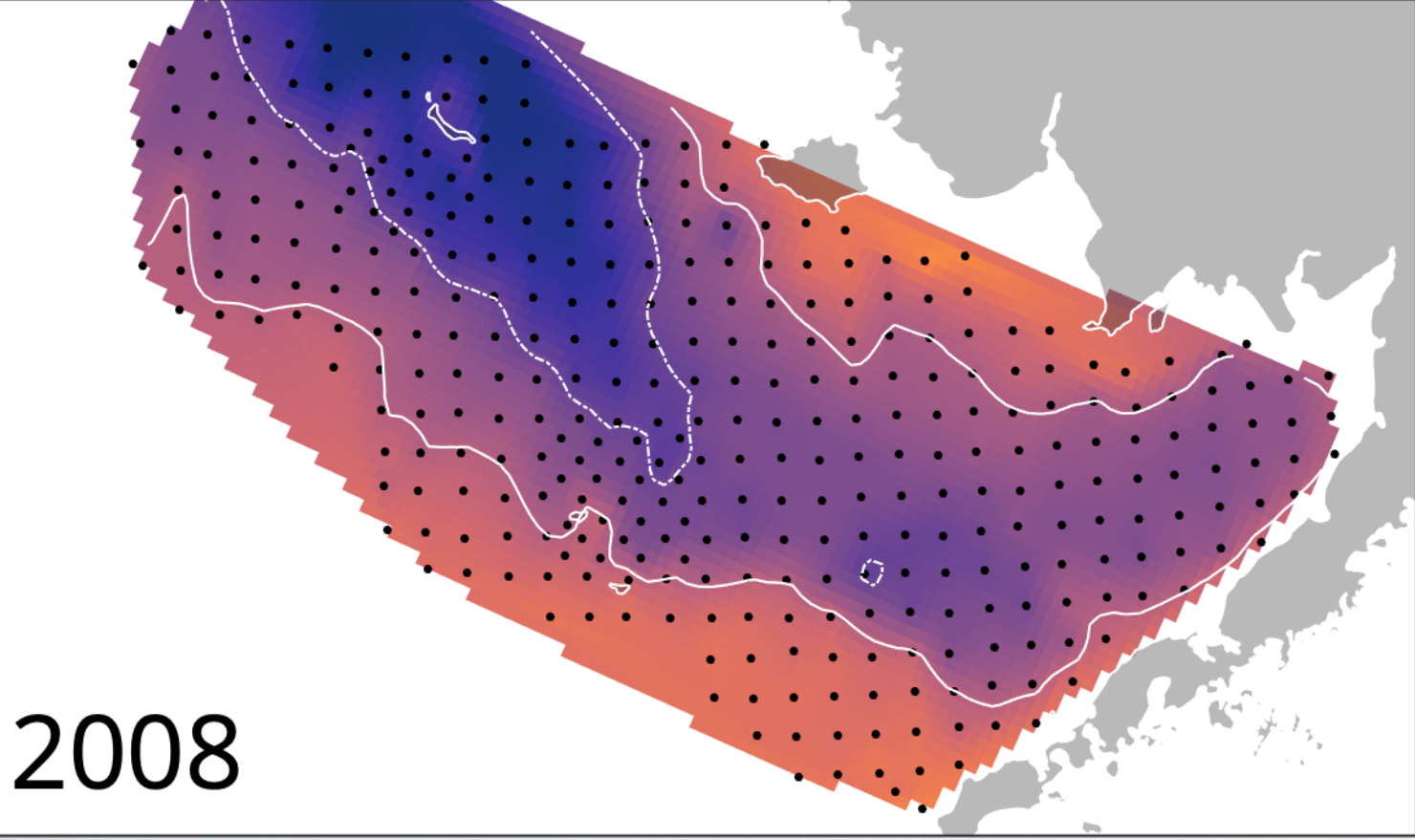
Bering10K ROMS (CFS-forced)



CFS



2004



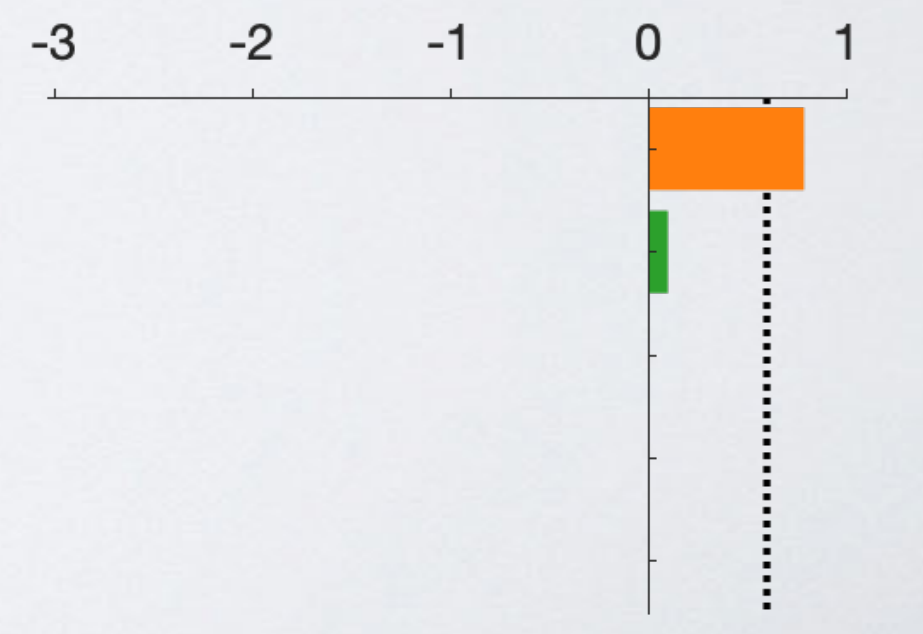
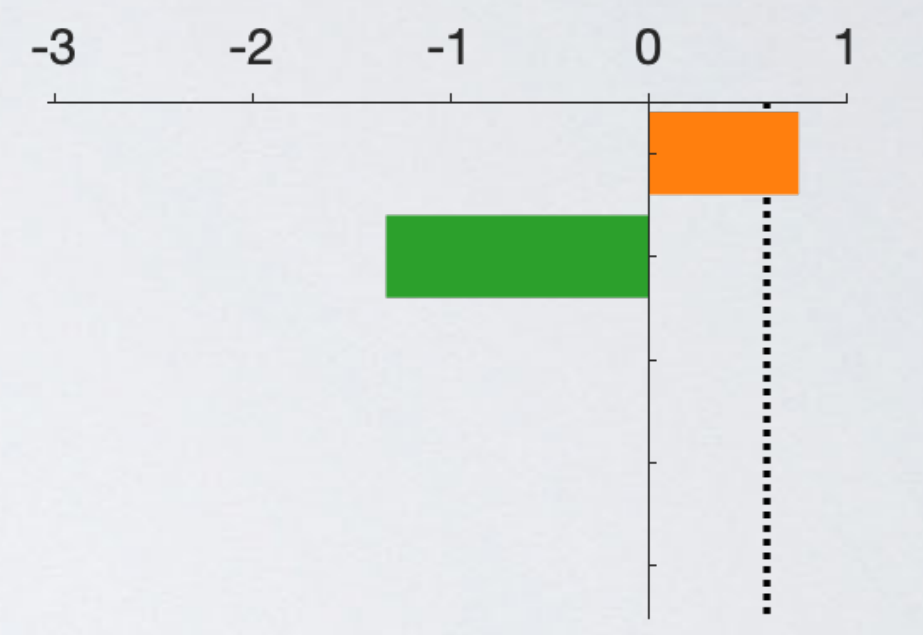
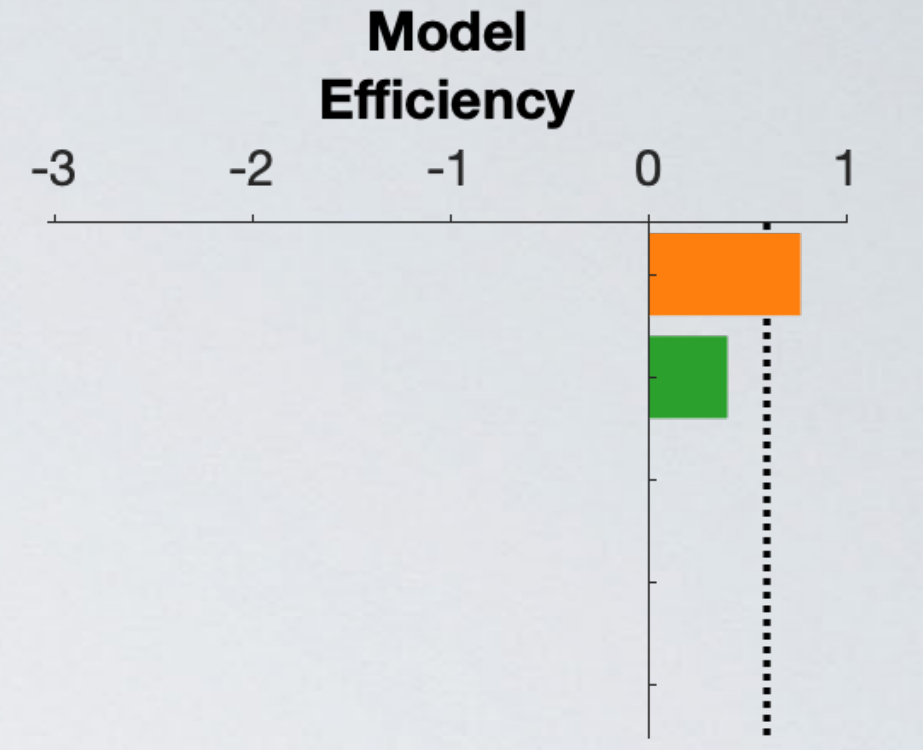
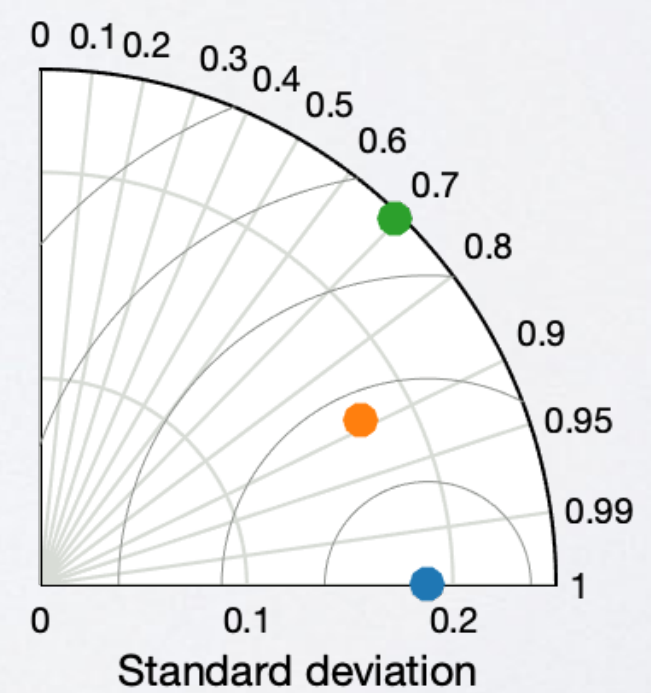
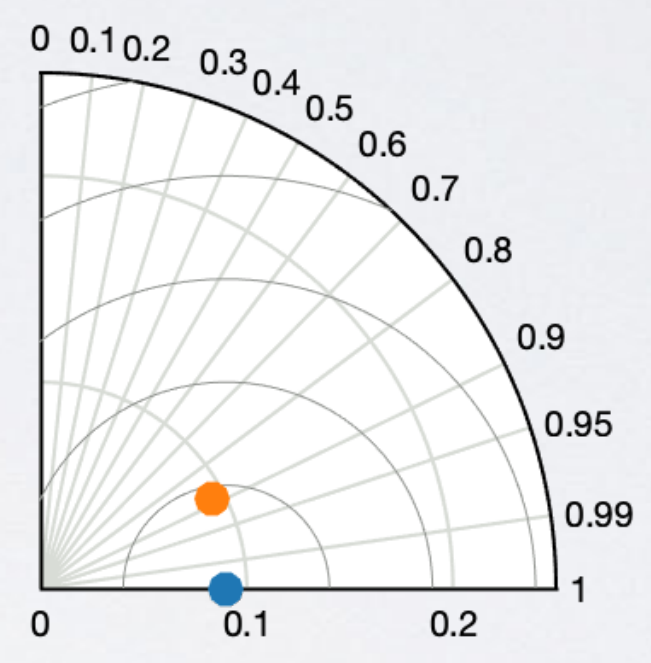
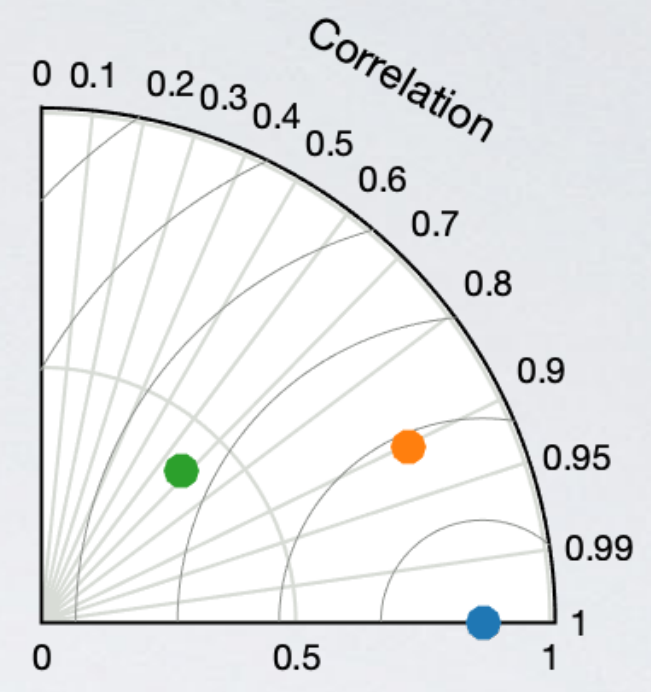
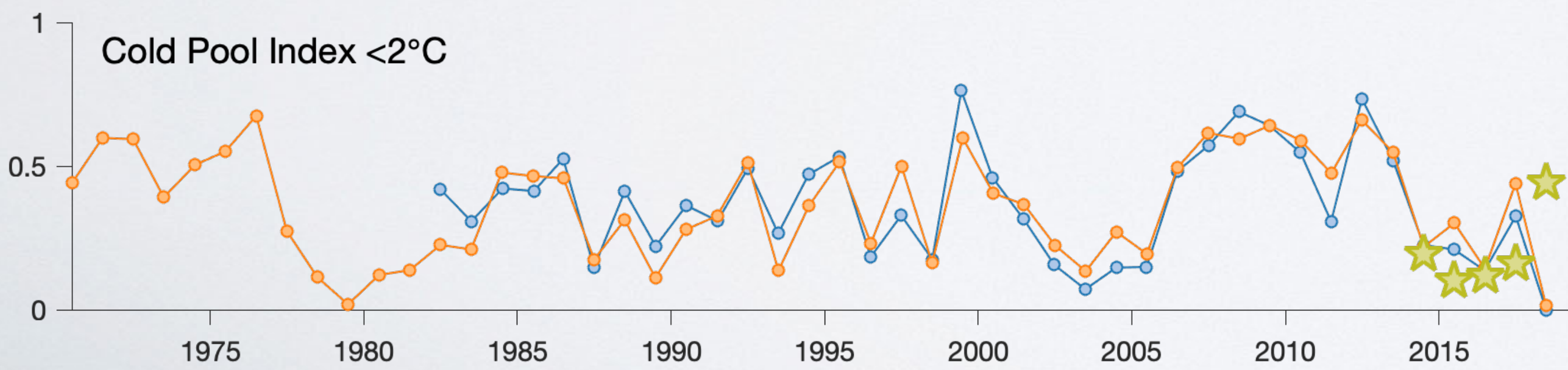
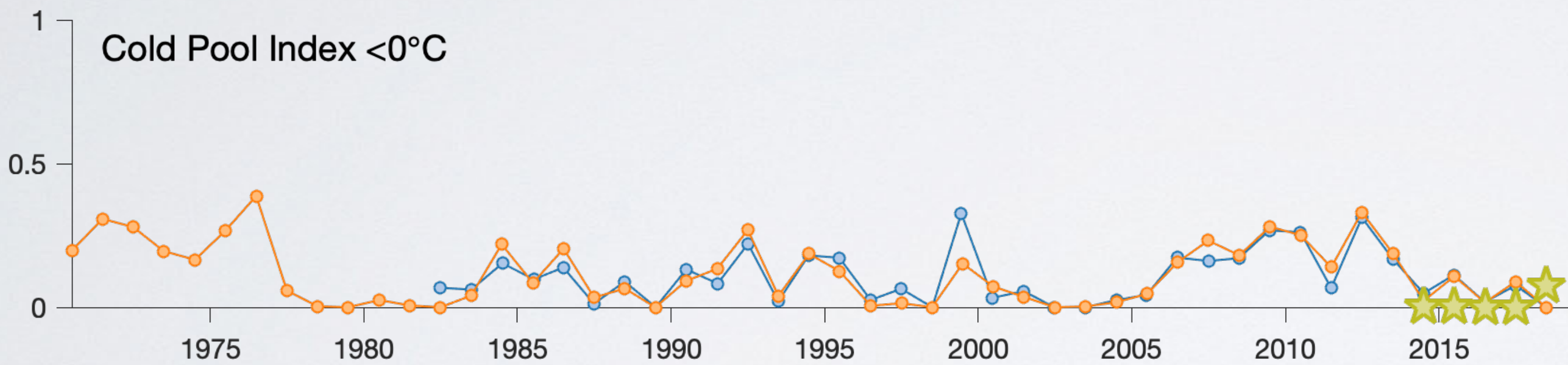
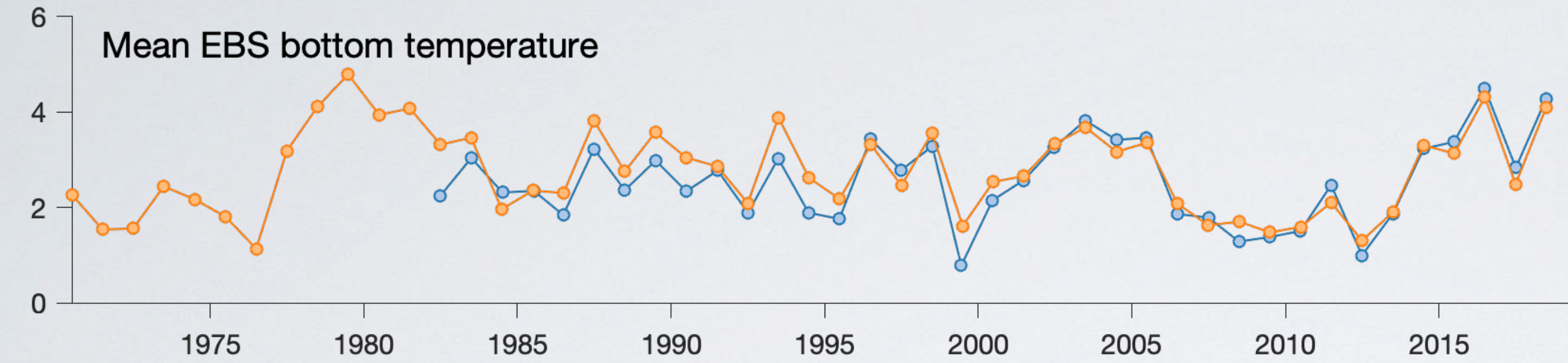
2008

Can we simulate the cold pool?

groundfish survey

Bering10K downscaling of CFS

CFS



We can *hindcast* the cold pool well. Can we forecast it?

The Plan:

Downscale the 9-month seasonal reforecasts from the North American Multi-model Ensemble (NMME) and quantify the skill of our regional model in capturing interannual variability of the cold pool.

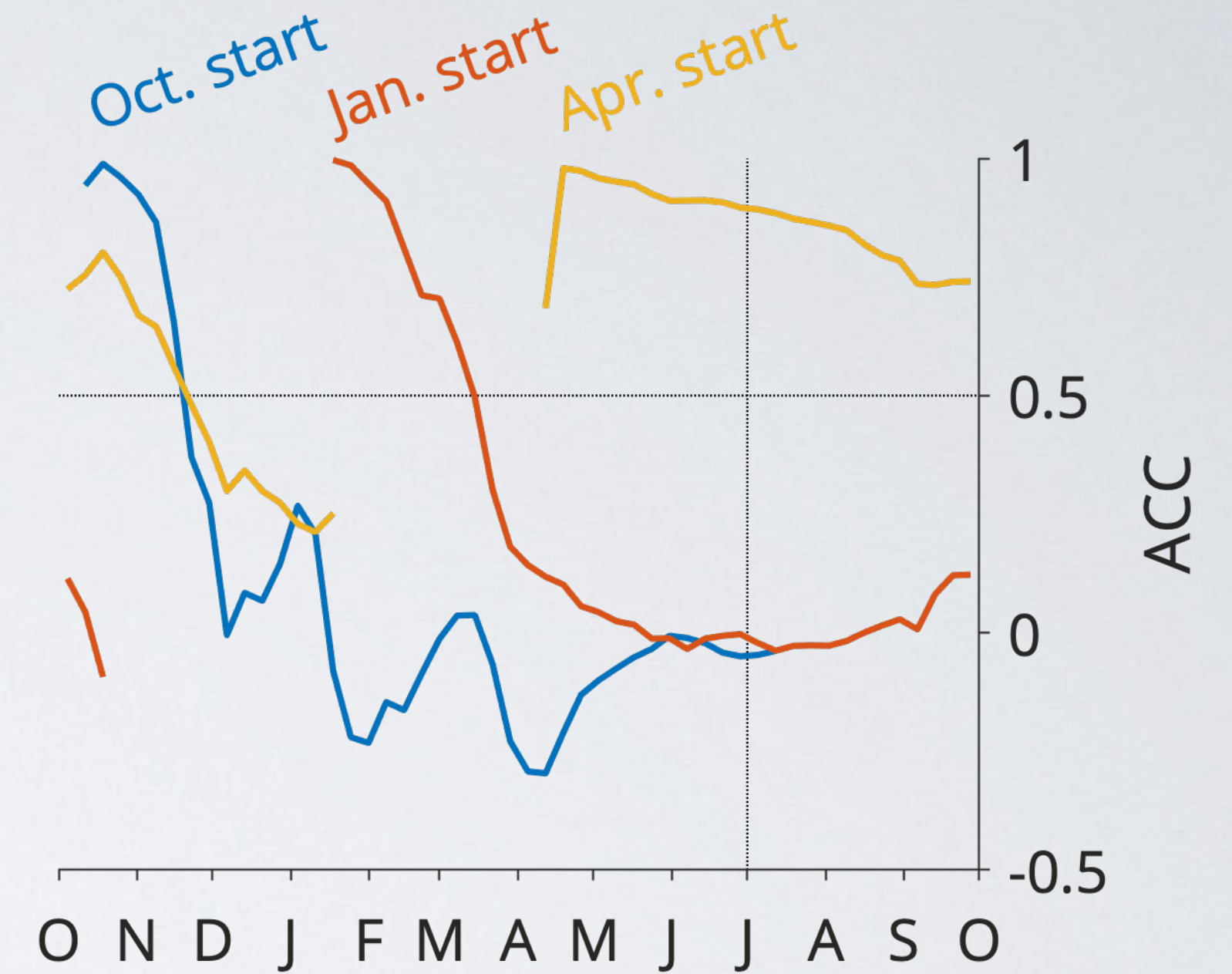
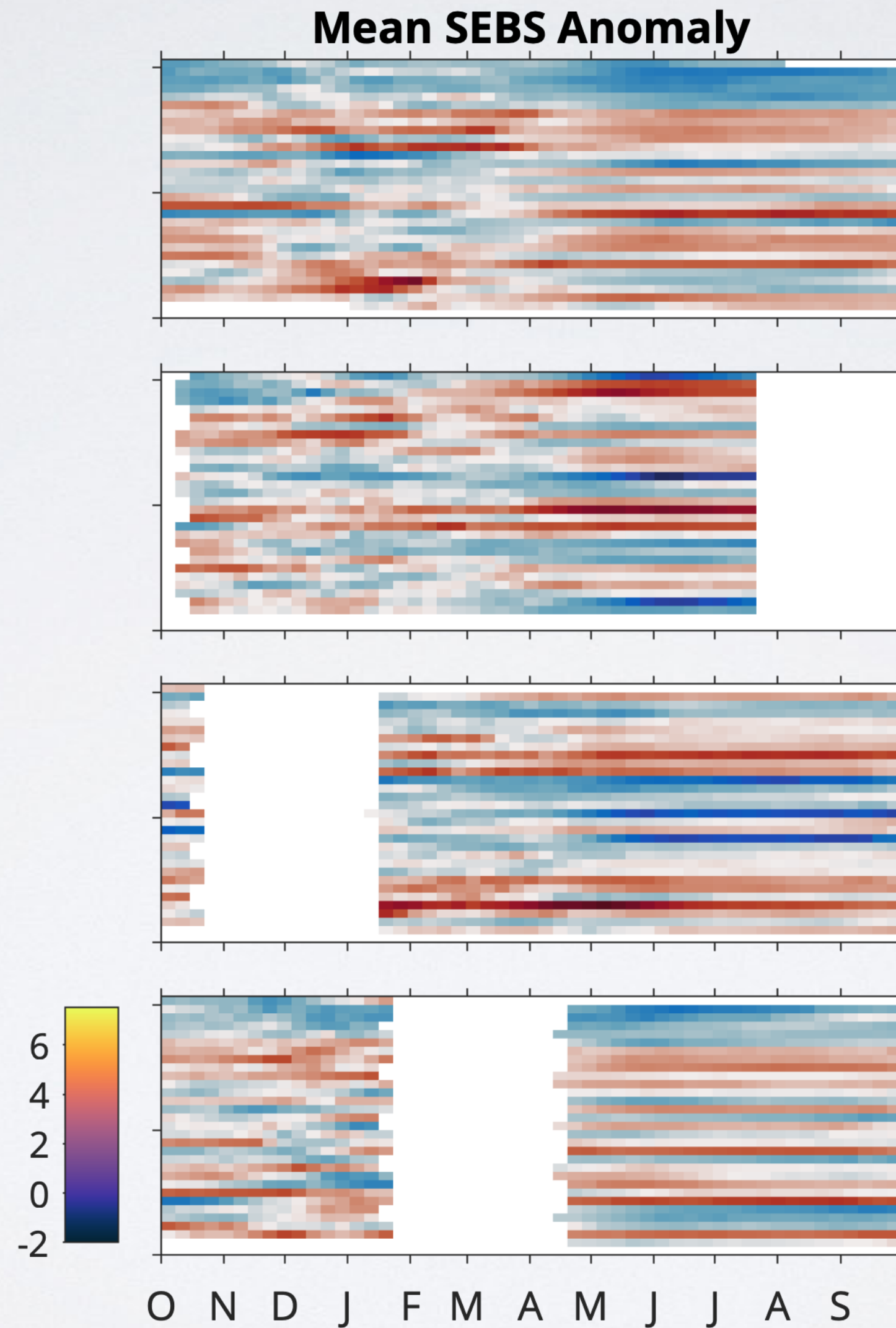
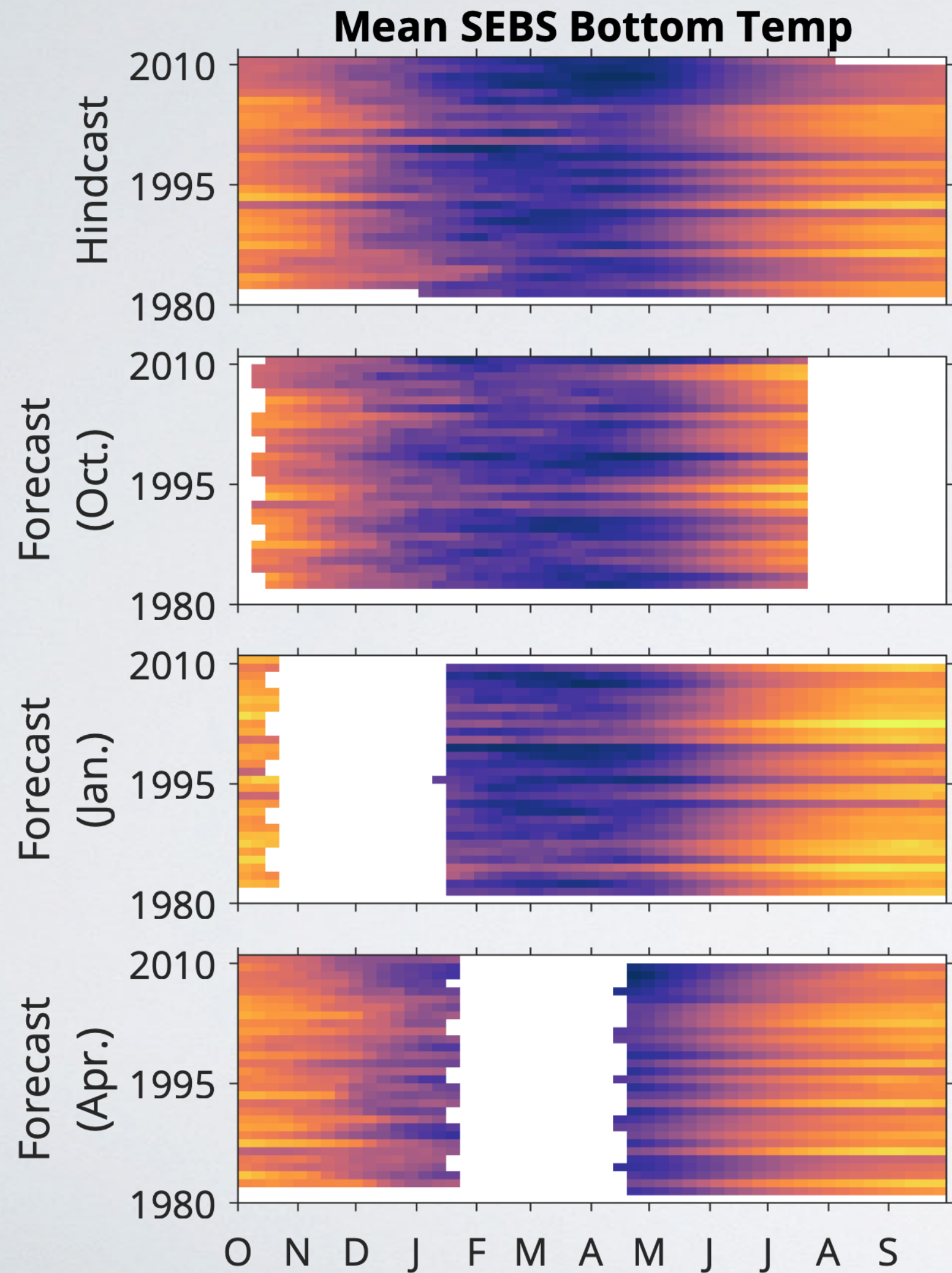
A slight problem with the plan...

North American Multi-model Ensemble (NMME)

- Start times must include all 12 months
- 9 month lead times, minimum
- Target dates: 1981-2010
- Required output: SST, 2-m temperature, precipitation rate, more fields “based on experience and demand”

	NCAR CCSM4	NCAR CESM1	NCEP CFSv2	CCCma CanCM3	CCCma CanCM4	GFDL FLORB01	GSFC GEOS5
Jul					X		
Aug					X		
Sep					X		
Oct		...	X	?	X		
Nov		...	X	?	X		
Dec		...	X	?	X		
Jan		...	X	?	X		
Feb		...	X	?	X		
Mar		...	X	?	X		
Apr		...	X	?	X		
May		...	X	?	X		
Jun		...	X	?	X		

CFSv2 preliminary results



Preliminary conclusions

- Given appropriate surface boundary forcing, the Bering10K model reproduces cold pool variations.
- There is a winter predictability barrier
 - The CanCM4 model shows elevated skill over the CFSv2 model... but the barrier remains
 - Ensemble-averaged values show elevated skill compared to single iterations of a model... but the barrier remains
- Forecasts initialized in April have high skill through summer.

